

What is claimed is:

1. A thermal insulating composition, comprising at least one water-superabsorbent polymer capable of absorbing a minimum of its own weight in water.
- 5        2. The thermal insulating composition of Claim 1, wherein the at least one water-superabsorbent polymer is capable of absorbing a minimum of 20 times its own weight in water.
- 10       3. The thermal insulating composition of Claim 2, wherein the at least one water-superabsorbent polymer is capable of absorbing a minimum of 100 times its own weight in water.
- 15       4. The thermal insulating composition of Claim 3, wherein the at least one water-superabsorbent polymer is capable of absorbing a minimum of 700 times its own weight in water.
- 20       5. The thermal insulating composition of Claim 4, wherein the at least one water-superabsorbent polymer is capable of absorbing a minimum of 1,000 times its own weight in water.
- 25       6. The thermal insulating composition of Claim 1, wherein the at least one water-superabsorbent polymer comprises an alkali metal salt of an aqueous alcoholic alkali saponified cross-linked homopolymer of acrylonitrile or methacrylonitrile.
- 30       7. The thermal insulating composition of Claim 6, wherein the cross-linked homopolymer of acrylonitrile or methacrylonitrile is cross-linked with N,N'-methylene-bis-acrylamide.
8. The thermal insulating composition of Claim 6, wherein the at least one water-superabsorbent polymer is an alkali metal salt of an aqueous methanolic alkali saponified cross-linked homopolymer of acrylonitrile or methacrylonitrile.

9. The thermal insulating composition of Claim 1, wherein the at least one water-superabsorbent polymer is an alkali metal salt of an aqueous alcoholic saponified crosslinked polymer of 2-propenenitrile or 2-methyl-2-propenenitrile.

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10. The thermal insulating composition of Claim 1, wherein the at least one water-superabsorbent polymer is selected from the group consisting of:

(a) polymers resulting from the polymerization of water-soluble ethylenically unsaturated monomers, with partial crosslinking;

10 (b) starch-grafted polyacrylates;

(c) acrylamide/acrylic acid copolymers and salts thereof;

(d) starch-grafted acrylamide/acrylic acid and salts thereof;

(e) isobutylene/maleic anhydride copolymers;

(f) sodium and potassium salts of carboxymethylcellulose;

15 (g) crosslinked salts of polyaspartic acid; and

(h) chitosan/polyvinylpyrrolidone and chitosan/polyethyleneimine combinations.

11. The thermal insulating composition of Claim 10, wherein the  
20 acrylamide/acrylic acid copolymers are chosen from sodium salts of acrylamide/acrylic acid copolymers.

12. The thermal insulating composition of Claim 10, wherein the starch-grafted acrylamide/acrylic acid is chosen from sodium and potassium salts of starch-  
25 grafted acrylamide/acrylic acid.

13. The thermal insulating composition of Claim 1, wherein the at least one water-superabsorbent polymer is present in an amount ranging from about 0.05% to about 30% by weight, relative to the total weight of the composition.

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14. The thermal insulating composition of Claim 13, wherein the at least one water-superabsorbent polymer is present in an amount ranging from about 0.2% to about 20% by weight, relative to the total weight of the composition.

- 5           15. The thermal insulating composition of Claim 1, further comprising:
- (a) a brine and/or water;
  - (b) a viscosifying polymer; and, optionally,
  - (c) a polyol, a biocide and/or corrosion inhibitor.

10           16. The thermal insulating composition of Claim 15, further comprising a crosslinking agent.

17. The thermal insulating composition of Claim 16, wherein the crosslinking agent contains a borate, zirconium IV or titanium IV.

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18. The thermal insulating composition of Claim 1, wherein the viscosity of the composition is sufficient to reduce the convection flow velocity of the composition upon introduction into the annulus.

20           19. The thermal insulating composition of Claim 1, wherein the composition further comprises brine and/or water and the viscosity of the composition is sufficient to at least partially immobilize the fluid.

25           20. The thermal insulating composition of Claim 15, wherein the viscosifying polymer is a polysaccharide or a homo-, block or random polymer containing vinyl alcohol, acrylate, pyrrolidone, 2-acrylamido-2-methylpropane sulfonate, or acrylamide units.

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22. The thermal insulating composition of Claim 21, wherein the glycol is ethylene glycol or propylene glycol.

23. The thermal insulating composition of Claim 20, wherein the polysaccharide is cellulose, starch, galactomannan gum, xanthan, succinoglycan or scleroglucan or a derivative thereof.

24. The thermal insulating composition of Claim 23, wherein the polysaccharide is alkylcellulose, hydroxyalkyl cellulose, alkylhydroxyalkyl cellulose, carboxyalkyl cellulose derivative, guar gum, hydroxypropyl guar, or carboxymethylhydroxypropyl guar.

25. The thermal insulating composition of Claim 24, wherein the polysaccharide is methyl cellulose, hydroxyethyl cellulose, hydroxypropyl cellulose, hydroxybutyl cellulose, hydroxyethylmethyl cellulose, hydroxypropylmethyl cellulose, hydroxybutylmethyl cellulose, methylhydroxyethyl cellulose, methylhydroxypropyl cellulose, ethylhydroxyethyl cellulose, carboxyethylcellulose, carboxymethylcellulose or carboxymethylhydroxyethyl cellulose.

26. A method for enhancing the thermal insulation of a production tubing or transfer pipe surrounded by at least one annuli, comprising:

adding the fluid composition of Claim 1 to the at least one annuli; and

maintaining the fluid in contact with the at least one annuli to at least partially immobilize the fluid composition.

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27. A method for reducing convection flow velocity in at least one annuli surrounding a production tubing or transfer pipe, comprising:

introducing into the at least one annuli an insulating packer or riser fluid comprising the fluid composition of Claim 1; and

maintaining the fluid in the at least one annuli until the convection flow velocity is reduced.

28. The method of Claim 27, wherein the fluid composition is a packer or riser fluid and further wherein the packer fluid is introduced above the packer in an annulus and the riser fluid is introduced into a riser annulus.

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29. The method of Claim 26, wherein the fluid composition further contains a viscosifying polymer selected from a polysaccharide or a homo-, block or random polymer containing vinyl alcohol, acrylate, pyrrolidone, 2-acrylamido-2-methylpropane sulfonate, or acrylamide units.

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30. The method of Claim 27, wherein the fluid composition further comprises a polyol and/or a brine.

31. The method of Claim 30, wherein the polyol is a glycerol, glycol or a polyglycol.

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32. The method of Claim 31, wherein the glycol is ethylene glycol or propylene glycol.

33. The method of Claim 29, wherein the polysaccharide is cellulose, starch, galactomannan gum, xanthan, succinoglycan or scleroglucan or a derivative thereof.

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34. The method of Claim 33, wherein the polysaccharide is alkylcellulose, hydroxyalkyl cellulose, alkylhydroxyalkyl cellulose, carboxyalkyl cellulose derivative, guar gum, hydroxypropyl guar, or carboxymethylhydroxypropyl guar.

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35. The method of Claim 34, wherein the polysaccharide is methyl cellulose, hydroxyethyl cellulose, hydroxypropyl cellulose, hydroxybutyl cellulose, hydroxyethylmethyl cellulose, hydroxypropylmethyl cellulose, hydroxybutylmethyl cellulose, methylhydroxyethyl cellulose, methylhydroxypropyl cellulose,

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ethylhydroxyethyl cellulose, carboxyethylcellulose, carboxymethylcellulose or carboxymethylhydroxyethyl cellulose.

36. The thermal insulating composition of Claim 1, wherein the at least one  
5 water-superabsorbent polymer is selected from:

- (a) an acrylonitrile or methacrylonitrile starch graft copolymer;
- (b) an alkali metal salt of a saponified granular starch-polyacrylonitrile or starch-polymethacrylonitrile copolymer; and
- (c) hydrolyzed polyacrylonitrile, polymethacrylonitrile or a copolymer of  
10 either acrylonitrile or methacrylonitrile containing less than 50 weight percent of a copolymerizable monomer.